

## 10.0 Parcel Management

### 10.1 Overview of Parcel Management Use Cases

#### 10.1.1 Concepts

The use cases for Parcel Management (PM) are intended to describe the various business processes necessary to maintain land records in an automated environment. The first use case, *PM-01 Verify Parcel*, outlines the various steps necessary in the original filing of a document (i.e., deed being recorded or application filed). *PM-02 Construct Legal Description* allows for creation and maintenance of current and historical legal descriptions. *PM-03 Edit Legal Description Fabric* allows for generation and maintenance of survey and non-survey descriptions and geometries in an integrated 'coverage' that are the building blocks for parcel legal descriptions. (See Figure 10.1 for a high-level view of the NILS data architecture) *PM-05 Edit Parcel Fabric* allows for building and attributing parcels necessary to maintain a 'coverage' based on a particular business practice (e.g., ownership, rights, and restrictions) in a user-defined geographic area.

There are certain key survey and mapping terms that must be understood in order to 'navigate' the Parcel Management use cases. Please reference the complete listing of definitions available within the appendix. A diagram is also included in this overview to help explain the relationship between the various measurement network and fabric 'layers.'

#### 10.1.2 NILS Data Architecture

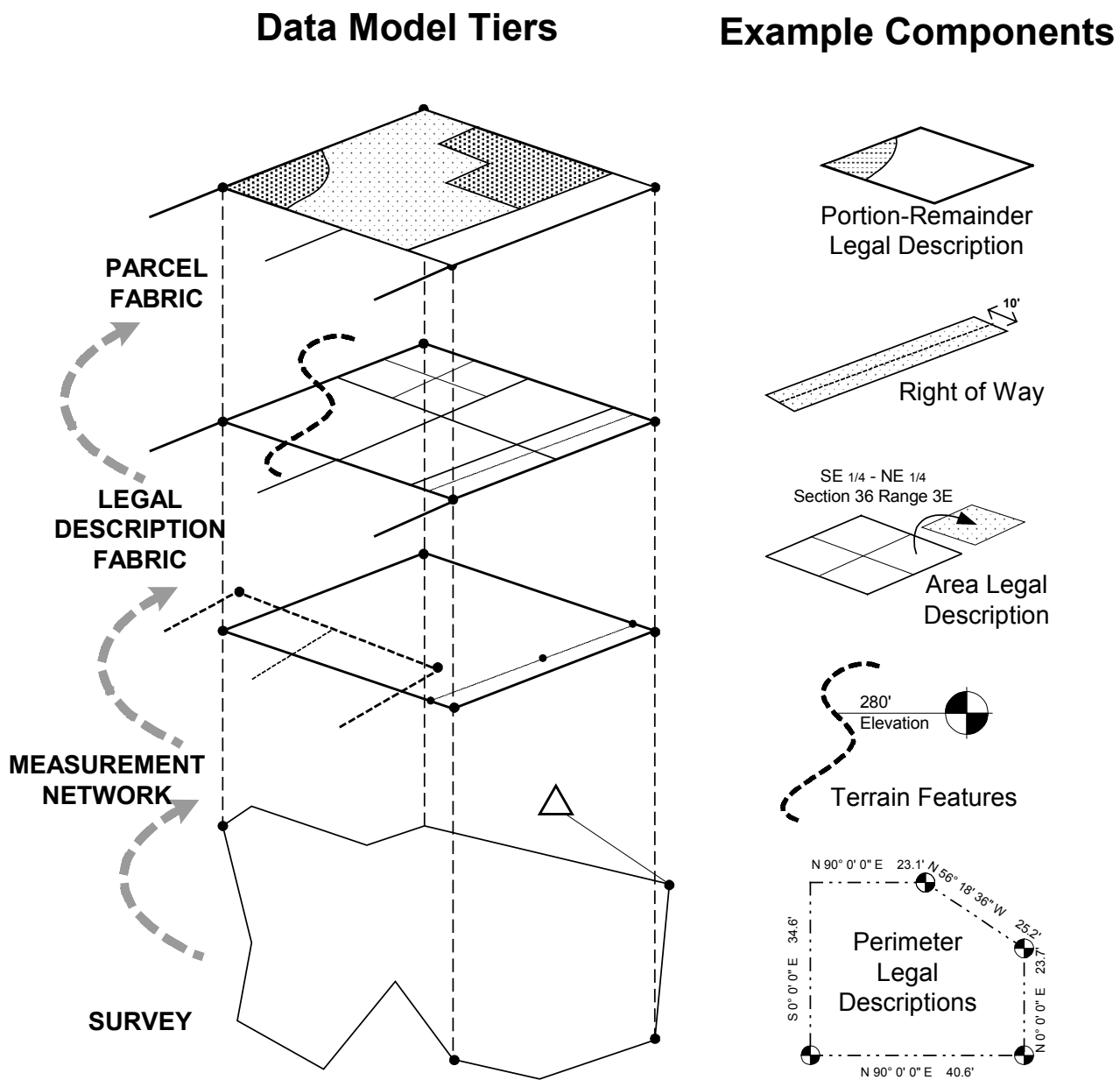
Figure 10.1 illustrates that Legal Description (LD) fabric is separate from parcel fabrics. Area, perimeter, and portion/remainder legal descriptions are generated in the LD fabric by processes (use cases) within Measurement Management (MM) and Survey Management (SM) and/or by legal description editors using automated tools (e.g., *COGO*) within the LD fabric. The parcel fabrics are maintained in PM use cases (i.e., parcel editors choose when and exactly what changes need to be made for a parcel).

The layers need to be separate for several reasons: (1) not all parcels have been described in terms of legal description(s), and (2) not all legal descriptions to date have been created in a separate LD fabric through use of coordinate geometry, section subdivision, or digitizing/adjustment from a map (data conversion issues). One of the goals of the parcel editor should be to strive for better control. As stand-alone parcels get created/ updated, additional legal descriptions will be created, and the parcel will be defined (or re-defined) in terms of the legal description(s). This new description based on one/several legal descriptions attached to a parcel is defined as the parcel legal area description.

The 'toolkit' for maintenance of LD and parcel fabric will be very **comparable** and is often described within survey use cases or as 'system level' functionality. The data requirements (which support the functional requirements) for LD and parcel editors are **very different**. As a rule, parcel editors will concentrate on work relating to ownership, land use rights, management, beneficiary, tax assessment, administration, land management, and many other types of parcel right and restriction issues. LD editors will concentrate activity within the

broad categories of survey/survey maintenance based on control established within the *measurement network*.

**Figure 10.1. High level View of NILS Data Architecture  
(Measurement Network, Legal Description Fabric, and Parcel Fabrics)**



## 10.2 Parcel Management Use Case Analysis

The remainder of this section presents the individual parcel management use cases. In the NILS 'Field to Fabric' concept, measurement management use cases are used to build measurement networks as the geometric sources for fabrics.

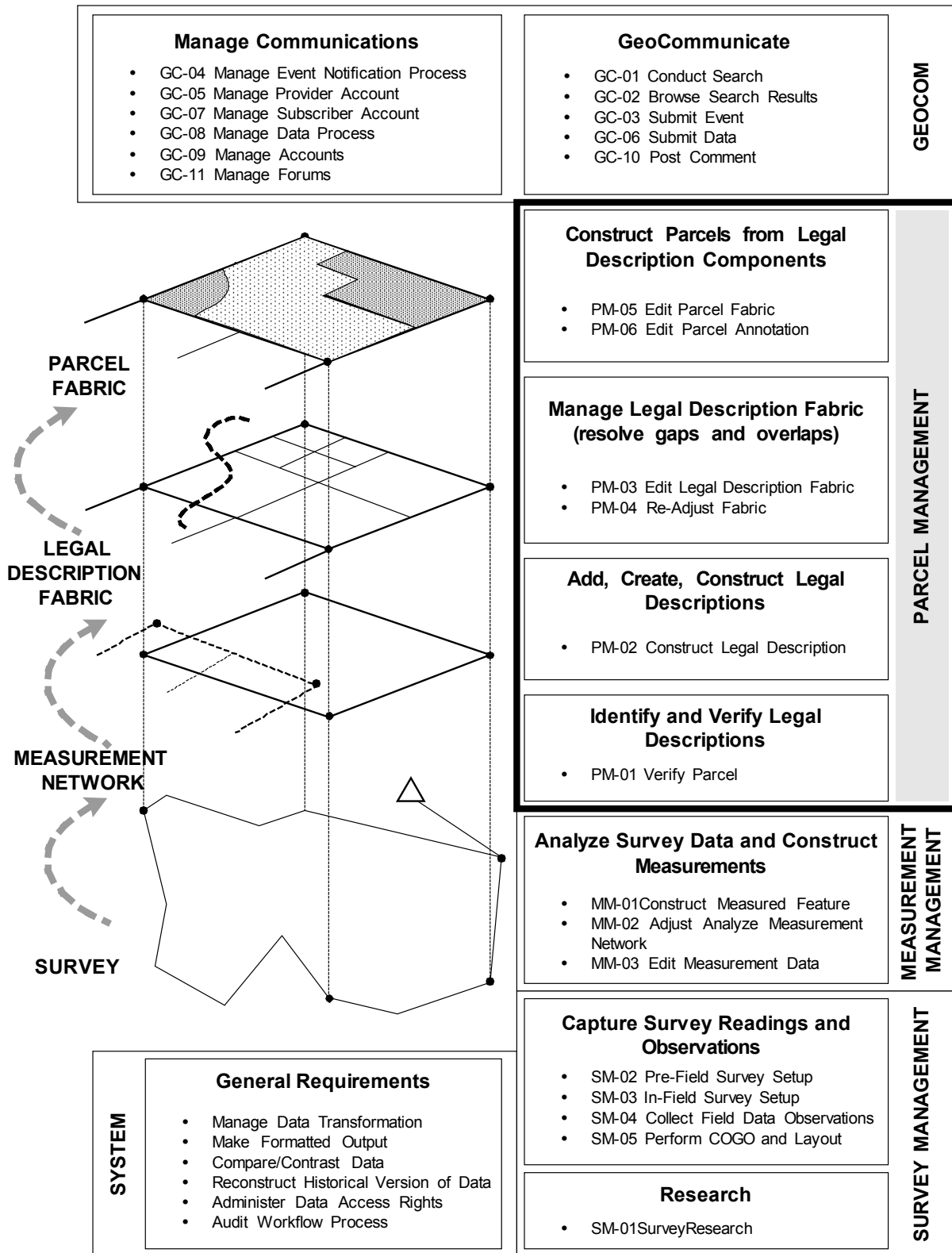
Please note that Parcel Management as a process would have access to the system functionality provided to support other use cases. Therefore use cases such as ***SM-05 Perform COGO and Layout***, Make Formatted Output (a system requirement), ***MM-02 Adjust and Analyze Measurement Network***, and ***MM-01 Construct Measured Feature*** are utilized in the parcel management process, but are not included in this section.

Table 10.1 lists the Parcel Management use cases. Figure 10.2 shows the relationship of these use cases to the other NILS use cases.

**Table 10.1. Parcel Management Use Cases**

| Use Case                               | Section | Description   |
|--|---------|---|
| PM-01<br>Verify Parcel                 | 10.3    | To identify and verify parcels affected by an initiating event and to determine the appropriate maintenance actions needed to process the parcel(s) or event.   |
| PM-02<br>Construct Legal Description   | 10.4    | Process to create the basic <i>legal description</i> components—geometry and attributes (text, ID, source ID, etc.). Legal descriptions may have topological association to <i>features</i> (e.g., <i>parcels</i> ), to component features and/or to <i>measurements</i> . Legal descriptions may be saved into a collection of unadjusted legal descriptions (includes historic legal descriptions). |
| PM-03<br>Edit Legal Description Fabric | 10.5    | Process to edit the <i>legal description fabric</i> . Insert new <i>legal description</i> components and/or edit existing components. Fit, assemble, and resolve <i>legal description</i> components within the legal description fabric.   |
| PM-04<br>Re-adjust Fabric              | 10.6    | Process for adjusting the coordinates of an existing <i>feature fabric</i> (e.g., <i>legal description fabric</i> , <i>parcel fabric</i> ) to enhance (cartographic) alignment with a reference source that has desired <i>control features</i> (also known as map control).  |
| PM-05<br>Edit Parcel Fabric            | 10.7    | Process to define <i>parcels</i> within the <i>parcel fabric</i> by associating or aggregating <i>legal description(s)</i> from the <i>legal description fabric</i> . Process to create new parcel records and/or to edit parcel attribute values.  |
| PM-06<br>Edit Parcel Annotation        | 10.8    | Create or modify annotation within or associated to <i>parcel fabric</i> , <i>legal description fabric</i> , or <i>measurement network</i> to support display and formatted output.   |

**Figure 10.2. Business Process Analysis—Parcel Management Use Cases**



## 10.3 PM-01 Verify Parcel

### 10.3.1 PM-01 Verify Parcel Analysis

#### Context

The process to verify a parcel given its description is one of the most common land records management operations. Once verified, the records pertaining to the subject parcel can be queried or modified, or if the parcel does not exist, an update process can be initiated.

Customers (i.e., the public, making miscellaneous inquiries) often know a parcel owner, a parcel location, a parcel address, a parcel identification number, and so on, and want to access all available information about the property.

Land records managers must interpret parcel-related documents either prior to, or after they are recorded. Interpretation is needed to (1) verify the status of the parcel, and (2) to determine the appropriate action required to correctly process the document.

Surveyors, attorneys and title companies access records to verify and/or write parcel legal descriptions and associated documents that control the spatial extent and use of property. Often these professionals are performing research and analysis to compare and contrast parcel-related information, sometimes by reconstructing historical configurations of ownership or other rights in land.

Mistakes made in verifying or processing parcel legal descriptions can cause significant problems at many levels. Errors are perpetuated into the record, and researchers who do not make comprehensive inquiry may utilize the wrong version of a parcel legal description. The potential for adverse economic impact in terms of rights and interests is large—in some cases the difference of a foot can be worth hundreds of thousands of dollars.

Verification of parcels is part of the larger process for managing land records. In every agency, there is a workflow associated with the proper disposition of any document. Sometimes these documents act as triggers and initiate a variety of reviews and processes. It is essential that the workflow process is managed effectively to ensure compliance with the regulations that govern an agency's document-processing duties. Often this document management involves multiple steps during which information, notes, decisions and actions must be compiled and shared with the next agent in workflow process.

## New Concepts

**Bureau motion.** A land action initiated by the Bureau of Land Management or another federal entity.

**Classification.** The process of determining whether the lands are more valuable or suitable for transfer or use under particular or various public land laws than for retention in Federal ownership for management purposes.

**External triggers.** Transactions in an associated system or database that cause the need for processing in NILS.

**Parcel legal description.** A composite description that contains all the *legal descriptions* that define a parcel and can be used to derive the full spatial extent of the parcel.

**Right.** An interest recognized and protected by the law, respect for which is a duty, and disregard of which is a wrong (Salmond). A capacity residing in one man of controlling, with the assent and assistance of the State, the actions of others (Holland). Burke, J. (1976). Osborne's Concise Law Dictionary, 6<sup>th</sup> Edition. London: Sweet and Maxwell.

**Restrictive covenant.** An agreement creating an obligation contained in a deed, forbidding the commission of some act.

**Sketch.** A draft or interim version of a parcel, that is used as the basis for creating a new parcel and/or to verify the geometry, attributes and validity of a given *parcel legal description*.

**Subdivision rule.** (*Portion/Remainder, Perimeter Or Other Area Reference*). See *Legal Description*. The available methods to divide or aggregate parcels according to a specific survey system.

**Transaction agent.** Any participant or party identified in land transaction.

**Withdrawal.** Withholding an area of Federal land from settlement, sale, location, or entry under some or all of the general land laws, for the purpose of limiting activities under those laws in order to maintain other public values in the area, or reserving the area for a particular public purpose or program, or transferring jurisdiction over an area of Federal land, other than property from one management agency to another.

## Key Features- Functionality

This use case covers three basic functions, (1) identifying a property, (2) verifying the attributes of the property, and (3) determining a processing method and submitting the document into the workflow management system.

Identification may occur by a variety of methods based on the document or parcel information known to the actor. Searching

would include geographic and logical queries. Spatial searches would typically be a 'drill-down' from a wide area (city, county, township, forest, region, etc.) into a specific area. Attribute queries might include searching by a unique *legal description*, parcel identification number (PIN), other attribute (address, owner, case number), or event category (new claims, vacated rights-of-way, annexations, etc.).

Of course it is possible that the parcel cannot be found because it is new or its reference attributes are incorrect. Possible additional functionality might include rejection of the document, editing of the database to correct an error, or editing to create the new parcel record.

As part of creating a new parcel record, having the ability to sketch a parcel would include tools to translate a parcel legal description into its representative boundary geometry. Sketching may involve the use of COGO methods to traverse the boundary of a metes and bounds legal description. Sketching may also include tools for creating a new parcel record is by applying a pre-defined subdivision rule to an existing parent parcel. Subdivision rules would be associated with a survey system (e.g., 'quarter a PLS section').

Once the parcel is found or sketched, the actor may review (sometimes edit) various attributes to verify that the subject parcel is indeed valid and may be further processed. The actor would employ one of several pre-defined verification processes to review the status of the parcel. An example verification method would be to display of attributes, *rights*, *transaction agents*, *restrictive covenant*, and parcel acreage in comparison to subject geometry.

Once the parcel is verified, the actor must determine the proper processing action. The system would provide maintenance processing choices such as attribute change (owner name change, etc.), geometry change (division or aggregation), replacement or revision to document. The exact choice of processing operations would be based on the workflow environment of the agency.

#### **Application Integration**

***PM-01 Verify Parcel*** is integrated (1) with the ***PM-05 Edit Parcel Fabric*** use case tools and data handling, (2) with the Compare and Contrast Data and Reconstruct Historical version as verification methods, and (3) with the concept of *external triggers* as system actors that could initiate the ***PM-01 Verify Parcel*** use case or be triggered by the use case, as when an external system must be activated to handle the data management for newly-created parcels.

The integration of parcel verification with a workflow management system is a key integration issue. Each agency will have a 'customized' workflow system to some extent. There are many issues with managing workflow inter-dependencies, protocols and rules.

A single 'case' or transaction will often require parcel verification on multiple occurrences. In the Bureau of Land Management the 'life' of the case involves many configuration changes to the parcel's geometry and attributes. Over time, case transactions would trigger parcel verification multiple times as the necessary transactions are processed, perhaps on an associated external database.

**Development Implications**      The extent and depth of work required to integrate with, or develop, a 'workflow management system' for NILS is uncertain.

### 10.3.2 PM-01 Verify Parcel Overview

| Use Case               | PM-01 Verify Parcel   |
|------------------------|---|
| <b>Description</b>     | To identify and verify <i>parcels</i> affected by an initiating event and to determine the appropriate maintenance actions needed to process the parcel(s) or event.  |
| <b>Actors</b>          | Customer, Data Entry Person, Data Analyst, Parcel Editor  |
| <b>Pre-Condition</b>   | An initiating event has occurred (e.g., application received, deed recorded, public counter request, letter request, agency-determined need— <i>bureau motion, withdrawal, classification</i> , etc.). Actor needs to verify <i>parcel(s)</i> and determine appropriate action. |
| <b>Post-Condition</b>  | Affected <i>parcels</i> have been identified. The geometry of subject parcel may be selected (if pre-existing), sketched and/or saved (if new). Actor determines appropriate maintenance action.  |
| <b>Cross-Reference</b> | <b>PM-05 Edit Parcel Fabric</b> ; Compare and Contrast Data; Reconstruct Historical version; external triggers.   |

### 10.3.3 PM-01 Verify Parcel Primary Scenario

| Actor Action   | System Response   |
|--|---|
| 1. This use case begins when the actor launches the <b>PM-01 Verify Parcel</b> process.        | 2. Prompt actor to identify subject parcel by geography, <i>legal description</i> , parcel ID, other attribute or event category.<br><br>Provide option to import digital image or drawing, etc.  |
| 3. Input to identify subject <i>parcel</i> .   | 4. Process input. Attempt to find parcel. Display <i>parcel</i> , associated <i>parcel legal description</i> , and all component legal description geometries.<br><br>Provide verification methods (visual, new <i>sketch</i> , attribute comparison, other).   |
| 5. Select verification method to compare subject parcel with features from reference data set. | 6. Process verification method.<br><u>Example Verification Method:</u> Find and displays attributes, <i>rights</i> , <i>transaction agents</i> , <i>restrictive covenants</i> , and parcel acreage in comparison to subject geometry.<br><br>Provide maintenance processing choices.<br><u>Examples of maintenance:</u> attribute change (owner name change, etc.), geometry change (division or aggregation), replacement or revision to document. |
| 7. Actor determines appropriate maintenance action and selects action.                         | 8. Process action. Provide options to report, save, and submit subject <i>parcel</i> information into workflow process.<br><br>[submit into workflow] Provide workflow options  |
| 9. Input and submit to workflow.   | 10. Process subject parcel information and transmit to next step in workflow.   |

### 10.3.4 PM-01 Verify Parcel Secondary Scenarios

| Name   | Point of Occurrence/Overview   |
|--|--|
| Import digital image or drawing, etc.  | Step #2. Actor will import the subject <i>parcel</i> from a digital source. Imported parcel(s) will provide input to Step #4.  |
| Subject <i>parcel legal description</i> not found.   | Step #4. Notify actor. Provide options to:<br>reject document (advise customer and interrupt processing of document)<br>sketch parcel, or forward to <b>PM-03 Edit Legal Description Fabric</b> or <b>PM-05 Edit Parcel Fabric</b> use cases (may be a new parcel—pass to editor as a new transaction)   |
| Sketch parcel.   | Step #4. Enable survey tools (COGO and measurement management, etc.). Process input iteratively as needed to complete <i>sketch</i> . Provide options to close <i>sketch</i> . Process closure as appropriate. Attempt to close. Report error and display adjustments with subject <i>parcel(s)</i> located and highlighted. Option to return/revise.<br><br>[Parcel will not close within tolerance] Notify actor. Possible optional step is to enter a 'Research Edits' analysis mode. |
| Create Legal description by <i>subdivision rule, legal description portion/remainder, legal description perimeter</i> or other <i>legal description area reference</i> . | Select parent area. Step through definition of the subject part. Derive legal description of subject and remainders. Assign IDs.   |
| <i>External triggers</i>   | NOTE: In the case of iterative transactions, this use case can be initiated multiple times from outside this use case via another database.<br><br>It is important to note that a single 'case' or transaction will often access this use case on multiple occurrences throughout the 'life' of the case.  |

## 10.4 PM-02 Construct Legal Description

### 10.4.1 PM-02 Construct Legal Description Analysis

#### Context

Typically, land records management requires the capability to generate *legal descriptions* that have both a geometry and a text description. The description is relative to some survey system (including the PLS System, among others).

The *legal description* may be thought of as the 'atomic parcel', or as the described area or linear unit(s) that constitute a *parcel*. Passive agencies, such as Recorders and Registers of Deeds may desire to save *legal description* footprints in an unadjusted data set. The geometry (footprints) of *legal descriptions* may be constructed (like *measured features*), and stored in a collection (feature class) without performing interpretation and adjustment to resolve gaps and overlaps. This collection of legal description *geometries* might include historical as well as current *legal descriptions*, and so be used to support research.

Because people write, interpret, and change *legal descriptions*, the descriptions are often incorrect. For the purpose of maintaining a topologically-clean *legal description (or parcel) fabric*, we have to adjust the geometries to resolve gaps and overlaps. There are many cases where *legal descriptions* must be interpreted and adjusted rather than positioned and used verbatim as indicated in the deed document. (For example, a boundary line of a parcel is intended to follow a section line, is described as running due south, and the actual section line does not have a due south bearing.) The legal description/parcel editor would interpret the *legal descriptions* and make adjustments to resolve these types of inconsistencies.

Recall from the analysis of the **MM-01 Construct Measured Feature** use case that in the NILS data model, parcels are built up from *legal description* geometries which are managed in the adjusted *legal description fabric*. A *parcel legal description* may reference one or more underlying *legal descriptions*. *Legal description* geometries may be constructed just as *measured features* (see **MM-01 Construct Measured Feature**) associated to underlying *measurements*. This three-tier, topological data model is the basis for integrating GIS and survey within the NILS framework.

## New Concepts

**Legal Description.** The narrative and geometric description for a discrete area of land. Descriptions may be related to parcels (many-to-many) and to geometries.

**Area Legal Description.** (AKA Areal Reference) e.g., geopolitical, PLS, Block-Lot, Mineral Survey, irrigation lots. Nominal; delimited in reference survey system having area taxonomy, nesting and division rules; discussion of ‘tracting’ and frameworks for spatial indexing.

**Perimeter Legal Description.** Record boundary, metes and bounds, sequenced set of bearings and distances, strip description, adjoiner description, riparian or aquatic area description, reference calls to natural features (contour, ridgeline, watercourse).

**Portion/Remainder Legal Description.** Area as a quantity (e.g., ‘north sixty acres of.’, ‘the north four-hundred feet of...’), exclusions; other reference calls; ambiguous areas that cannot be mapped relative to any reference.

**Legal Description Fabric.** (See *Measurement Network*). An *adjusted measurement network* to which constructions (terrain feature boundaries, non-survey data) have been added. An *adjusted measurement network* to which constructions (terrain feature boundaries, non-survey data) have been added. All polygons representing legally-described areas have been formed from the measurement network and other boundaries to support the *parcel fabric*.

**Parcel Fabric.** (See *Measurement Network*). A feature class that represents a parcel configuration for a specific business purpose (e.g., ownership parcels, tax parcels, historic parcels). Parcel features may be associated with component features in the *Legal Description Fabric*.

## Key Features- Functionality

This set of operations includes functionality for constructing both text and geometric representations of a *legal description*. Construction methods (corresponding to *legal description* types) include area subdivision (section or parcel split/combine), perimeter (metes and bounds), and portion/remainder. *Legal descriptions* may be saved for future use in building the *legal description* and *parcel fabrics*.

**Application  
Integration**

Constructing *legal descriptions* is part of the land records management process that must be integrated with the workflow management system. Once constructed, *legal descriptions* are adjusted into a *legal description fabric*, and are used to build parcels in the *parcel fabric*.

In the **PM-01 Verify Parcel** use case, legal descriptions may be sketched or created—this would involve the tools provided in this **PM-02 Construct Legal Description** use case. Much of the functionality for this use case is based upon the **MM-01 Construct Measured Feature** use case.

The actor may import a parcel legal description as sketched in the **PM-01 Verify Parcel** use case. This is part of the integration of workflow management.

**Development  
Implications**

See the development implications in the **MM-01 Construct Measured Feature** use case. The same issues of managing a tiered, topologically-related data structure apply in this use case.

Legal descriptions may be constructed against a reference layer (i.e., by using the geometry of a feature in the legal description fabric). The system must handle reference data that is stored in a spatial reference system that is different from the subject spatial reference system .

## 10.4.2 Construct Legal Description Overview

| Use Case               | PM-02 Construct Legal Description   |
|------------------------|---|
| <b>Description</b>     | Process to create the basic <i>legal description</i> components—geometry and attributes (text, ID, source ID, etc.). <i>Legal descriptions</i> may have topological association to features (e.g., parcels), to component features and/or to measurements. <i>Legal descriptions</i> may be saved into a collection of unadjusted <i>legal descriptions</i> (includes historic <i>legal descriptions</i> ). |
| <b>Actors</b>          | Surveyor, Supervisor, Parcel Editor, External Trigger   |
| <b>Pre-Condition</b>   | Reference and component features are available. <i>Legal description</i> does not exist.  |
| <b>Post-Condition</b>  | <i>Legal description</i> is created, attributed and stored appropriately.   |
| <b>Cross-Reference</b> | <b>MM-03 Edit Measurement Data, PM-01 Verify Parcel, PM-05 Edit Parcel Fabric, PM-03 Edit Legal Description Fabric, MM-01 Construct Measured Feature</b>  |

### 10.4.3 PM-02 Construct Legal Description Primary Scenario

| Actor Action  | System Response   |
|---|---|
| 1. This use case begins when a actor chooses <b><i>PM-02 Construct Legal Description</i></b> .                    | 2. Prompt to establish edit session. Display index to available reference data— <i>legal description fabric</i> , <i>parcel fabric</i> , other <i>measurement network</i> features.<br><br>[workflow established in ' <b><i>PM-01 Verify Parcel</i></b> '] apply previous parameters<br>[no data set] establish current <i>measurement data set</i> |
| 3. Input to set up construction session. Set working <i>spatial extent</i> and reference data elements.           | 4. Update display, symbolized to indicate type and (historical) status of reference data elements.<br><br>Display choices for <i>legal description</i> construction.<br><br>[digital plat, plan or sketch exists] provide import option   |
| 5. Make choice to either (1) Import plat, plan or sketch, or (2) Input to define a new <i>legal description</i> . | 6. Process construction method. Prompt for input from actor as needed.  |
| 7. Input as appropriate to construct geometry, text and attribute values for the new <i>legal description</i> .   | 8. Apply inputs and complete construction. Display new <i>legal description</i> against reference data.<br><br>Provide choices: Save, Revise, Next Feature, Undo, Quit.   |
| 9. Inspect <i>legal description</i> . Select from choices.  | 10. Perform chosen operation.<br>[save] save to <i>legal description</i> collection (options to trigger operational workflow/transaction tracking system, e.g., to measurement adjuster and <i>legal description fabric</i> adjuster)<br>[revise] return to #7<br>[next] return to #5<br>[quit] exit  |

## 10.5 PM-03 Edit Legal Description Fabric

### 10.5.1 PM-03 Edit Legal Description Fabric Analysis

|                                   |  |
|-----------------------------------|--|
| <b>Context</b>                    | <p>Recall from the analysis of the <i>PM-02 Construct Legal Description</i> use case (1) that an individual <i>legal description</i> has a geometry—the 'footprint' as an atomic unit, and (2) that parcels are built up from <i>legal description geometry</i>.</p> <p>The <i>legal description fabric</i> is the structural tier that provides the foundation for parcels. It is within the <i>legal description fabric</i> that <i>legal description geometries</i> are resolved into a seamless framework—a spatial representation of areas that have been legally described within a nested survey-system hierarchy.</p> <p>As new sources of parcel geometry (changes) occur (subdivision, deed splits, combinations, etc.) the respective <i>legal descriptions</i> are constructed and their geometries are incorporated into the <i>legal description fabric</i>. In the NILS data model, geometry editing occurs on these 'atomic areas' within the <i>legal description fabric</i>. <i>Legal description geometries</i> become the source for the <i>parcel fabric</i>.</p> <p>The <i>parcel fabric</i> tier is an application-oriented representation—a feature/data framework for managing business entities like ownership parcels, tax parcels and their associated rights, interests, uses, and restrictive covenants.</p> |
| <b>New Concepts</b>               | <p><b><i>Legal description geometry.</i></b> The 'footprint' of a <i>legal description</i>. A spatial representation of an area that has been legally described within a nested survey-system hierarchy. The 'atomic unit' for building parcels.</p>   |
| <b>Key Features-Functionality</b> | <p>Editing happens in a transactional environment, where features in a production version are locked and extracted to a working version. Edits are made to the working version, quality-controlled, accepted, and committed back into the production version.</p> <p>Basic editing tools are provided. If an error of geometry, attribute value, construction rule, or feature association is identified, the editor would have the tools to select the subject feature and reshape, modify attributes, etc.</p> <p>This set of operations also provides the means to insert new legal description geometries into a fabric. The insertion process will employ a set of procedures to perform line editing within a topological, two-dimensional planar geometric network. This means that each area is unique and that these areas share common</p>   |

boundaries (perimeter lines) and corners (nodes and vertices). An area may be split or subdivided, causing the 'parent' area to become 'historical' and the 'child' areas to become 'active'. Two or more areas may be combined—the parents become historical areas and the new 'child' is activated.

A set of procedures are required to process the insertion properly. Tools for performing COGO procedures are provided to modify the constructed geometries and fit them into the fabric. There are business rules for splits and combinations, there are rules for resolving conflicts, differences, gaps and overlaps. There are rules for establishing and recording precedence. The rules as applied during division and aggregation are preserved in association to the subject features.

Support for the multi-tier data model is provided. This means that legal description geometries may have ties to underlying measured features (in a measurement network) as well as ties to parcels in a 'higher' tier. There is actor control over the type and extent of automatic geometric updating that occurs among features which have geometric/topological associations.

## **Application Integration**

Legal description components (text description, attributes and geometry) are built as noted in the ***PM-02 Construct Legal Description*** use case. Editing must use constructed legal description components.

Editing will require connection to associated databases in some cases.

Once edited, the legal description fabric may be 're-adjusted' by establishing associations to various controls (survey control, map control).

Once the seamless representation of legal descriptions is edited, the actor may need to update respective map annotation features (see ***PM-06 Edit Parcel Annotation***).

The tightest integration is with the parcel fabric, which may be thought of as a kind of 'view', 'shared geometry' or 'region' layer that is built upon the 'atomic' legal description layer.

As with all use cases, legal description fabric editing must be integrated with a workflow management system.

**Development Implications** The integration for relating *features* in the multi-tier model implies a more complex data model and therefore a more complicated maintenance procedure. The system must support automation from an existing data structure into the tiered model. However, the model must also support system implementations that opt to bypass the multi-tier approach.

### 10.5.2 PM-03 Edit Legal Description Fabric Overview

| Use Case               | PM-03 Edit Legal Description Fabric  |
|------------------------|--|
| <b>Description</b>     | Process to edit the <i>legal description fabric</i> . Insert new <i>legal description</i> components and/or edit existing components. Fit, assemble, and resolve <i>legal description</i> components within the <i>legal description fabric</i> .  |
| <b>Actors</b>          | Parcel Editor, Supervisor  |
| <b>Pre-Condition</b>   | A <i>legal description fabric</i> and possibly some newly-constructed <i>legal description</i> components exist. Actor needs to modify the <i>legal description fabric</i> .   |
| <b>Post-Condition</b>  | The <i>legal description fabric</i> has been modified. <i>Legal description</i> history has been posted. <i>Legal description fabric</i> resolution rules (and priority of their application) are saved and available to drive the annotation process and subsequent fabric modifications. |
| <b>Cross-Reference</b> | Link to attributes; <b>PM-02 Construct Legal Description</b> ; <b>PM-01 Verify Parcel</b> , Readjust Legal Description Fabric, Create-Modify Parcel Annotation   |

### 10.5.3 PM-03 Edit Legal Description Fabric Primary Scenario

| Actor Action  | System Response   |
|---|---|
| 1. This use case begins when a actor launches the <b>PM-03 Edit Legal Description Fabric</b> process. | 2. Prompt actor to establish an edit session (select <i>legal description fabric</i> , select a spatial extent, set session parameters).  |
| 3. Set session parameters, select <i>legal description fabric</i> and <i>spatial extent</i> .         | 4. Lock selected features in the <i>legal description fabric</i> . Extract selected features from <i>legal description fabric</i> to a working version. Display the working version of the <i>legal description fabric</i> . Provide editing tools (insert new legal description component, edit existing component, etc.). |

| Actor Action   | System Response  |
|--|--|
| 5. Select edit process and interact with system to perform edit. | <p>6. Process edit.</p> <p>[insert new <i>legal description</i> component]<br/>provide choices for newly constructed legal description component, provide insertion tools (split/merge/re-shape geometry, change attributes, change feature relationships, etc.)</p> <p>[edit existing <i>legal description</i> component]<br/>provide selection and edit tools (change attributes, geometry and relationships)</p> <p>Resolve any conflicts caused by insertion and/or edits (e.g., remove gaps and overlaps). Store procedures used to resolve <i>legal description</i> conflicts and differences for each decision.</p> <p>Provide choices to return, exit, or commit working version prior to session closure.</p> |
| 7. Select Commit, Return, Exit.                                  | <p>8. Process action.</p> <p>[not done] Iterate until all conflicts and differences resolved.</p> <p>[commit] commit changes in working version to the <i>legal description fabric</i>. Update history.</p> <p>[feature relationship updates] per actor settings, update affected features (features in other layers that have an association to the legal description fabric).</p> <p>[exit] close session</p>  |

## 10.6 PM-04 Re-adjust Fabric

### 10.6.1 PM-04 Re-adjust Fabric Analysis

#### Context

There are situations for which the data steward of a particular series of digital map layers (feature fabrics) may need to make cartographic adjustments to improve the alignment of features in one fabric with corresponding features in a reference source. Frequently older-generations of digital maps were based on reference sources that were controlled at a low quality (little or no survey control). Reference sources might be new digital orthophotography, a new terrain model, new GPS coordinates, a new street centerline layer, etc.

While cartographic alignment is important to promote visually aesthetic maps, the primary reason for re-adjustment is to support analytical operations that use the map overlay process. Analysis of maps each based on different reference sources (control) will yield erroneous results.

It is generally anticipated that the re-adjustment is made to improve the quality of the subject features (increased accuracy in representing the real-world). However, it is possible to 'degrade' survey-controlled feature coordinates so that they more closely align with a particular map series (e.g., a map series that is a commonly-used agency standard). This would be the case if an agency found it more economical to align a small number of feature fabrics to match a more numerous set of mapping even though the 'reference series' was controlled at a lower-quality, rather than to attempt to re-align all the layers in the reference series to the higher-quality feature fabric.

In either scenario, the user may choose to develop the adjustment coefficients and apply them to a **set** of associated feature fabrics.

This process is similar to (and may actually use) the **MM-02 Analyze and Adjust Measurement Network** use case. The difference is that this operation may require the creation and use of controls that actually have a low reliability (less accurate than surrounding surveyed coordinates) but which in effect must act as very accurate controls to override the coordinate locations that are derived from the least squares adjustment process.

#### New Concepts

**Control.** A *feature* or set of features with positional coordinates that is used to adjust the geometry of an associated map layer.

**Key Features-  
Functionality**

The user makes selection of the reference source (from which the control will be selected) and one or more target feature layers.

Tools are provided to select (and define) controls in the reference source. Features in the target fabric(s) are then selected and linked to the control. The process is interactive—the entire set of controls could be established, to be followed by the association process; or the controls and features could be respectively defined and linked in an iterative (paired) process.

Once a set of controls are identified and a corresponding set of associated features have been linked, the user can perform re-adjustment. The re-adjusted feature fabrics are then shown relative to the reference source. The user can continue establishing controls, associating features, and running the re-adjustment until satisfied. The final re-adjustment is saved.

**Application  
Integration**

If the target feature fabric is one upon which other (tiered) fabrics are based, changes to the geometry of the target fabric must be automated into the associated fabric(s). An example of this would be when re-adjustment was performed on the *legal description fabric* and the effects were automated into the associated *parcel fabrics*.

**Development  
Implications**

There is a need to provide for non-standard types of control and ensure that the adjustment process supports their use.

## 10.6.2 PM-04 Re-adjust Fabric Overview

| Use Case:       | PM-04 Re-adjust Fabric  |
|-----------------|---|
| Description     | Process for adjusting the coordinates of an existing feature fabric (e.g., legal description fabric, parcel fabric) to enhance (cartographic) alignment with a reference source that has desired <i>control</i> features (also known as map <i>control</i> ). |
| Actors          | Parcel Editor   |
| Pre-Condition   | New <i>control</i> features of any type are available or can be generated from available reference sources.   |
| Post-Condition  | Coordinates of feature fabric(s) are adjusted.  |
| Cross-Reference | Measurement Management use cases; Edit Legal Description/Parcel Fabric  |

### 10.6.3 PM-04 Re-adjust Fabric Primary Scenario

| Actor Action   | System Response   |
|--|---|
| 1. This use case begins when a user launches the re-adjustment process.  | 2. Prompt user to select target feature fabric(s) and reference source.   |
| 3. Select target feature fabric(s) and reference source.   | 4. Display target feature fabric(s) and reference source.<br>Provide <i>control</i> section tools and prompt for identification of <i>control</i> .   |
| 5. Select <i>control</i> to be used. May need to define new <i>control</i> (may be coordinate point file, a location on a digital orthophotograph, etc.) | 6. Establish <i>control</i> and update display to indicate that <i>control</i> is available.<br>[new <i>control</i> ] provide tools to define <i>control</i> (type, coordinates, parameters, etc.)<br>[more <i>controls</i> to establish] return to #5<br>Provide choices for associating fabric features to control. |
| 7. Select from procedures. Select feature(s) from fabric(s) and associate to <i>control</i> .  | 8. Process associations iteratively until complete.<br>[not complete] return to #7<br>Provide choices for re-adjustment.  |
| 9. Select adjustment procedure. Respond to prompts and submit.   | 10. Perform adjustment and display results. Prompt to save/exit.<br>[solution not correct] return to #9<br>[edit/more <i>control</i> ] return to #5<br>[edit/more associations] return to #7  |
| 11. Review re-adjustment solution. Select save or exit.  | 12. Process choice.<br>[save] Save adjusted <i>control</i> , adjustment coefficients and fabric.<br>[exit] end session  |

## 10.7 PM-05 Edit Parcel Fabric

### 10.7.1 PM-05 Edit Parcel Fabric Analysis

|                                   |  |
|-----------------------------------|--|
| <b>Context</b>                    | <p>In the NILS data model, parcel geometry editing occurs on the 'atomic areas' managed within the <i>legal description fabric</i>. <i>Legal description geometries</i> become the source for the <i>parcel fabric</i>.</p> <p>The <i>parcel fabric</i> tier is an application-oriented representation—a feature/data framework for managing business entities like ownership parcels, tax parcels and their associated rights, interests, uses, and restrictive covenants.</p>  |
| <b>New Concepts</b>               | <p><u>Estate</u>.</p> <p><u>Transaction Agent</u>.</p>   |
| <b>Key Features-Functionality</b> | <p>Editing occurs in a transactional environment. The <i>parcel fabric</i> and the associated <i>legal description fabric</i> are selected, and the edit session is performed upon a working version.</p> <p>To create a new parcel, the editor establishes relationships to active <i>legal description geometries</i> that are the source for the parcel's geometry. For contiguous <i>legal description geometries</i>, internal lines would be dissolved to create the outer boundary of the parcel (according to the <i>parcel legal description</i>). A single parcel may be comprised of multiple, possible non-contiguous <i>legal description geometries</i>. Parcel Identification Numbers (PINS) are managed as the primary key, and the editor may also make general attribute value changes as well. Tools and procedures are provided to establish connections to remote data sources (for data viewing, linking and editing).</p> <p>Upon committing the working version to the parcel fabric, parent-child relationships and parcel history are managed.</p> |
| <b>Application Integration</b>    | <p>The system must support integration with document management (e.g., link a parcel to its associated documents), with workflow management (e.g., receive and send notifications), and with external triggers and databases (sources of change, or sources that are automatically updated based on the commit of updates to the parcel fabric).</p> <p>Annotation of the <i>parcel fabric</i> may performed from within the edit session.</p>   |
| <b>Development Implications</b>   | <p>The system must support data automation from pre-NILS databases. The system must support implementations that do not use the multi-tier fabric approach.</p>  |

### 10.7.2 PM-05 Edit Parcel Fabric Overview

| Use Case               | PM-05 Edit Parcel Fabric  |
|------------------------|---|
| <b>Description</b>     | Process to define parcels within the <i>parcel fabric</i> by associating or aggregating <i>legal description(s)</i> from the <i>legal description fabric</i> . Process to create new parcel records and/or to edit parcel attribute values. |
| <b>Actors</b>          | Parcel Editor   |
| <b>Pre-Condition</b>   | The <i>legal description geometries</i> necessary to define the parcel exist in the <i>legal description fabric</i> .   |
| <b>Post-Condition</b>  | <i>Parcel fabric</i> has been updated.  |
| <b>Cross-Reference</b> | <b><i>PM-03 Edit Legal Description Fabric</i>; <i>PM-02 Construct Legal Description</i>; <i>PM-01 Verify Parcel</i></b> ; External Applications/Triggers/Databases  |

### 10.7.3 PM-05 Edit Parcel Fabric Primary Scenario

| Actor Action  | System Response   |
|---|---|
| 1. This use case begins when the actor launches the <b><i>PM-05 Edit Parcel Fabric</i></b> process. | 2. Prompt to set up session. Provide available <i>parcel fabrics</i> , <i>legal description fabric</i> and tools to select subject.   |
| 3. Input to select fabrics and subject parcel(s).   | 4. Display fabric and selected parcels. Prompt to initiate a data lock or version transaction on selected parcel(s).  |
| 5. Interact with tools to establish transaction.  | 6. Process transaction. Establish the working set. Display working set. Provide tools to form parcels and edit attribute values.  |
| 7. Interact with tools to form new parcels and/or edit attribute values.                            | 8. Process action. May include processing related to <i>estates</i> , related parcels, and source documents (see secondary scenarios. May include processing related to attributes such as <i>rights</i> , <i>transaction agents</i> , <i>restrictive covenants</i> , and parcel acreage<br>Provide choices to repeat, revise parcel changes, exit session, commit changes. |
| 9. Select action.   | 10. Process action.<br>[revise] go to #7<br>[repeat] go to #2<br>[commit] update <i>parcel fabric</i> , close transaction, update history.<br>[exit]  |

#### 10.7.4 PM-05 Edit Parcel Fabric Secondary Scenarios

| Name  | Point of Occurrence/Overview  |
|---|---|
| Link to source documents  | Step 8. Invoke Document Management System for selection list of potential documents to link.  |
| Associate related parcels between different <i>parcel fabrics</i> | Step 8. Display <i>Parcel fabrics</i> and associate parcels and their associated attributes and prompt actor to define relationship(s). |
| Manage/define <i>estates</i>                                      | Step 8. Open or link to source of <i>estate</i> data for selection list to accept or modify.  |

## 10.8 PM-06 Edit Parcel Annotation

### 10.8.1 PM-06 Edit Parcel Annotation Analysis

|                                   |  |
|-----------------------------------|--|
| <b>Context</b>                    | <p>There are several aspects to handling annotation.</p> <p>Annotation may be derived automatically by an application that applies actor-defined parameters (for font, placement, etc.) and uses feature attribute values as the annotation text. This approach is generic and flexible, but sometimes fails to adequately handle text placement.</p> <p>To support high-quality formatted output, the cartographer may desire to attend to all aspects of annotation—text font, size, color, angle, etc. In this approach, annotation may be saved within the subject feature class (i.e., with the geometries), or it may be saved as a separate annotation feature class. This provides cartographers and actors flexibility in managing and displaying annotation for a variety of display situations (views and scales, etc.) and formatted output product types.</p> |
| <b>New Concepts</b>               | none   |
| <b>Key Features-Functionality</b> | <p>The actor selects the target fabric or measurement network and edits annotation. A set of annotation editing tools are provided to customize the annotation features. Actors may define new annotation symbols. Annotation edit are updated to the target feature fabric or measurement network.</p>  |
| <b>Application Integration</b>    | <p>This set of operations may be called from within the feature construction and/or fabric editing process. Editing may require transactional processing to manage data integrity.</p>   |
| <b>Development Implications</b>   | <p>May require development of a new set of survey-, measurement-, and parcel-based annotation symbols and procedures.</p>  |

## 10.8.2 PM-06 Edit Parcel Annotation Overview

| Use Case               | PM-06 Edit Parcel Annotation  |
|------------------------|---|
| <b>Description</b>     | Create or modify annotation within or associated to <i>parcel fabric</i> , <i>legal description fabric</i> , or <i>measurement network</i> to support display and formatted output. |
| <b>Actors</b>          | Cartographer, Parcel Editor   |
| <b>Pre-Condition</b>   | An existing <i>parcel fabric</i> , <i>legal description fabric</i> , or <i>measurement network</i> needs new or updated annotation.   |
| <b>Post-Condition</b>  | <i>Parcel fabric</i> , <i>legal description fabric</i> , or <i>measurement network</i> is annotated.  |
| <b>Cross-Reference</b> | <b>PM-05 Edit Parcel Fabric</b> , <b>PM-03 Edit Legal Description Fabric</b> , Construct Measured Features, <b>PM-02 Construct Legal Description</b>                                |

## 10.8.3 PM-06 Edit Parcel Annotation Primary Scenario

| Actor Action   | System Response  |
|--|--|
| 1. This use case begins when the actor launches the edit annotation process. | 2. Prompt for session setup—selection of annotation options (fonts, symbols, etc.), setup of style (size, position, etc.), custom annotation/symbol set, (tie-bars, ovals, actor-defined graphic features).<br><br>[nothing is selected] prompt actor to select <i>parcel fabric</i> , <i>legal description fabric</i> , or <i>measurement network</i> . |
| 3. Set annotation session options.   | 4. Display <i>parcel fabric</i> , <i>legal description fabric</i> , or <i>measurement network</i> . Provide annotation tools.  |
| 5. Interact with tools to select features and update annotation.             | 6. Process updates. Update display. Provide choices of Next/Exit/Save.   |
| 7. Select an action  | 8. Process action.<br>[need to adjust session] return to #2<br>[next] return to #5<br>[save] save <i>parcel fabric</i> , <i>legal description fabric</i> , or <i>measurement network</i><br>[exit] close session   |